In the Specifications

<u>Please amend the specification by replacing the following paragraphs:</u>

[0002] Nuclear Medicine imaging techniques enable to acquire functional information on a patient's specific organ or body system. This functional information is attained from analysis of internal radiation from pharmaceutical substance administered to the patient, which is ~~labeled~~labelled with a radioactive isotope. The radioactive isotope decays, resulting in the emission of gamma rays, thus providing information on the concentration of the radiopharmaceutical substance in regions of the patient's body. An instrument for the detection of gamma ray emissions of the radiopharmaceutical substance administered in the body is known as gamma camera. The Gamma camera collects gamma ray photons that are emitted from the patient's body, and the collected data is used to reconstruct an image or a series of images of the place in the body from which the gamma rays are originated. From this picture a physician can determine how a particular organ or system is functioning.

[0005] Different collimators are used in gamma cameras to limit the detection of photons to incidence range of predetermined angles. A parallel-hole collimator is typically made of lead or tungsten and has thousands of straight parallel holes in it, allowing only those gamma rays ~~traveling~~travelling in certain directions to reach the detector. As a result, the ratio of emitted versus detected photons may reach as high as 10000 to 1. In order to decrease this ratio, converging or diverging hole collimators, for example, fan-beam and cone-beam are also known in the art. The usage of these collimators increases the number of photon counts, which consequently improves sensitivity. Sensitivity, however, is inversely related to geometric resolution, which means that improving collimator resolution (i.e., having smaller diameter holes) decreases collimator sensitivity, and vice versa.

[0008] SPECT is considered to be a very useful technique and a good tool for obtaining functional diagnostic information, however it requires the collection of large number of emitted photons (large statistics) and this means that in order to obtain the required number of photons, a long acquisition time is necessary. Long acquisition time means that the patient is subjected to a relatively long period of discomfort, and, furthermore, the overall number of patients who can be imaged in a given time is relatively small – a feature that many medical institutes and hospitals regard as an extremely ~~unfavorable~~ <u>unfavourable</u> and undesirable situation.

[0021] Iterative reconstruction methods are used for SPECT. PCT/IL01/00730, published as WO 02/12918, <u>presently allowed US application No. 10,333,947, filed 1/22/2003,</u> and incorporated herein by reference, discloses methods for image reconstruction that result in enhanced three-dimensional nuclear image. These methods make uses and take advantage of collimators whose sensitivity is higher than collimators traditionally used in hospitals in order to collect larger number of detected photons within the data set, used for reconstruction of the enhanced three-dimensional image of superior quality.

[0022] In cardiac SPECT imaging, the radiopharmaceutical distribution in the myocardium of a [a] patient is imaged. Since the heart is beating, the heart wall motion blurs the image that is reconstructed from the accumulated data. In Gated SPECT imaging, the imaging is synchronized with the heart movement-cycle using electrocardiogram (ECG) signal.

[0057] In operation, detector 2 acquires radioisotope gamma ray photons 3, which are emitted from portion 4 of body 5 and passing through restricting means 10. The gamma photons impinge the photon detector crystal 6. If the crystal 6 is a semiconductor crystal, then the crystal converts the photons into electric signals, which are fed into a position logic circuitry 7 for processing. Alternatively, if the

crystal is a scintillation crystal such as NaI, that ~~utilizing~~ utilizes photo-multipliers, then the crystal converts photons 3 into scintillation light, which is, thereafter, transformed into electric signals by photo-multiplier 9.

[0090] In order to derive voxel values V_j of an image of the portion of the body and thereby to obtain a spatial distribution of the pharmaceutical substance indicating the functional information on this portion of the body, a mathematical model should be formulated and solved. Formulation of the mathematical model includes ~~modeling~~ modelling a relation between the set of values D_i and a set of unknown voxel values V_j of the image.

[0098] For instance the penalty function may be chosen in the form of

$F(V_j, V_k) = \sum_{j,k} (V_j - V_k)^2$, wherein the sum is taken over two ~~neighboring~~

neighbouring voxels having indices j and k. Such a penalty function expresses some prior knowledge about the smoothness characteristics of the reconstructed image. Other penalty functions, which preserve discontinuities are more adequate for SPECT reconstruction.

Please replace Table 1 with the following table.

Table 1

SPECT application Isotope Total span of angular projections Number of pixels used	Actual data acquisition duration (Effective acquisition time) In minutes Typical number of projections			
	Single-detector camera		Dual-detector camera	
	Art	Invention	Art	Invention
Bone SPECT Technetium 360 deg acquisition 128x128 or 64x64 matrix	30-40 (30-40) 120,128	10-20 (10-20) 40,60,64, 120,128	15-20 (30-40) 120,128	5-10 (10-20) 40,60,64, 120,128
Bone SPECT Technetium 180 deg acquisition 128x128 or 64x64 matrix	17-20 (17-20) 60,64	7-10 (7-10) 20,30,32, 60,64	12-20 (24-40) 60,64	5-10 (10-18) 20,30,32, 60,64
Cardiac Technetium, Thallium 180 deg acquisition 64x64 matrix	20-25 (20-25) 60,64	10-12 (10-12) 20,30,32, 60,64	12-18 (24-36) 60,64	6-12 (12-20) 20,30,32, 60,64
Brain Technetium, Thallium 360 deg acquisition 128x128 matrix	20-40 (20-40) 120,128	10-20 (10-20) 40,60,64, 120,128	20-30 (40-60) 120,128	7-15 (14-30) 40,60,64, 120,128
Medium energy Oncology Gallium, Indium, Iodine 360 deg acquisition 128x128 or 64x64 matrix	30-50 (30-50) 60,64, 120,128	10-25 (10-25) 60,64, 120,128	20-40 (40-80) 60,64, 120,128	9-20 (18-40) 60,64, 120,128